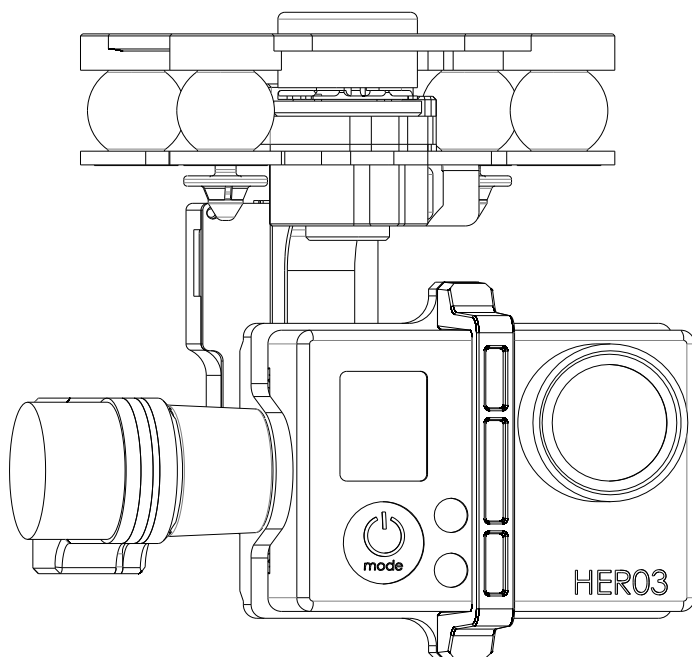


ZENMUSE H3-3D Gimbal

User Manual v1.00

2014.03.20



Warning & Disclaimer

H3-3D gimbal is calibrated before delivery, no adjustment or modification to the gimbal is allowed.

Ensure the camera is mounted to the gimbal before powering the aircraft.

H3-3D gimbal is finely calibrated according to the specified camera model and lens before the delivery. User does not need to perform extra calibration. Do not attempt to modify the gimbal or mount extra component/device (such as filter, lens hood, etc.) to the camera; be sure to use the DJI approved battery; otherwise it may affect the performance of the gimbal.

The H3-3D gimbal is compatible with following DJI flight control system: NAZA-M, NAZA-M V2, WooKong-M and Phantom 2 and A2. To optimize the gimbal performance, download the above mentioned Assistant Software and upgrade the firmware of the flight control system.

Make sure the flight control system is operating in the safest manner. We strongly recommend customers to remove all propellers before powering the aircraft, use power supply from R/C system or flight pack battery, and keep children when calibrating and configuration the gimbal. Observe the procedures contains in this manual to mount and connect gimbal on your aircraft. User of this product shall respect the AMA 's National Model Aircraft Safety Code.

DJI Innovations has no control over use, setup, final assembly, modification (including use of non-specified DJI parts i.e. motors, ESCs, propellers, etc.) or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability. DJI assumes no liability for damage(s), injuries or legal responsibilities incurred directly or indirectly from the use of this product.

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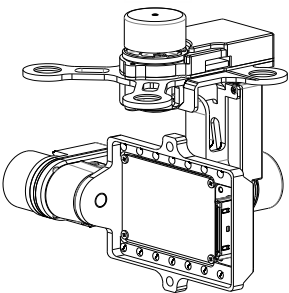
Profile

The H3-3D gimbal offers excellent stabilization features for aerial hobbyist and professional aerial photographers. Powered by built-in IMU (Inertial Measurement Unit) and special servo module, this gimbal provide unique stable quality visual experience for the users.

In The Box

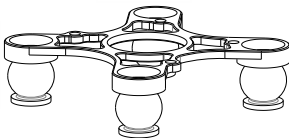
Gimbal×1

Built-in servos and stand-alone IMU provide yaw, roll and tilt stabilization. Integrated bottom damping plate minimizes installation time.



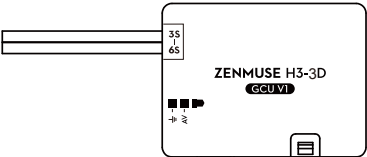
Damping Unit×1

The upper plate of the damping unit connects the gimbal with the Phantom 2. Pre-installed vibration absorbers greatly reduce the vibrations.



Gimbal Controller Unit (GCU)×1

Connect gimbal controller to flight control system using CAN-Bus.
Power GCU and gimbal through 3S-6S power cable.



Accessory Pack ×1

The accessory pack includes: vibration absorbers, securing pins and washers, screws and connection cables.



Accessory Pack – Spare Vibration Absorbers x4

Spare vibration absorbers for damping unit with 40 °of rigidity.



Accessory Pack – Securing kits x4

Spare securing kits that are used to secure the upper and bottom plate of the damping unit.



Accessory Pack – Camera securing bracket x1

Camera mounting bracket.



Accessory Pack – Spare Screws ×1

M2.5x6.3 : Mounting camera to gimbal.

M2.5x5 : Secure gimbal to damping unit.

M3x8 : Securing gimbal to aircraft.



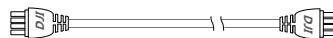
Accessory Pack – Gimbal Video signal Cable ×1

For the gimbal controller unit and your wireless video transmission module connection, transmitting the video signal.



Accessory Pack – CAN-Bus Cable×1

Use CAN-Bus to connect the GCU with the flight control system.



Accessory Pack – 8-Pin Cable×1

Connect to Phantom 2 or G8 port of GCU.



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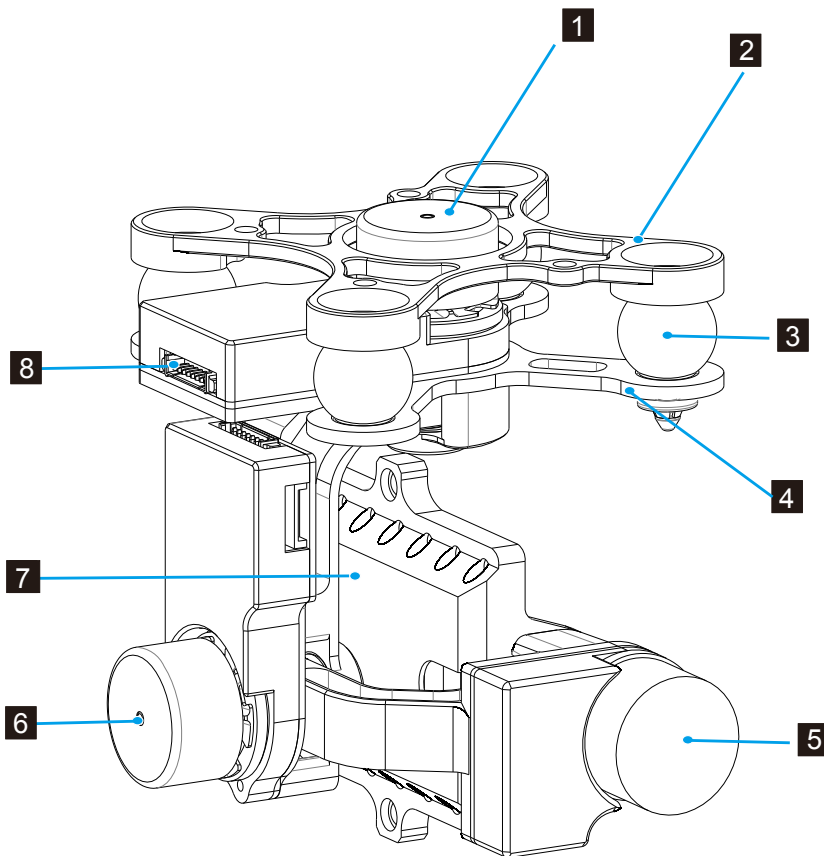
1 Installation

1.1 Gimbal Description

Notes:

- (1) Ensure the gimbal servos are unobstructed, failure to do so may damage the servo.
- (2) Clear the obstacles at once if the operating gimbal is being blocked.
- (3) Always mount camera before powering on the gimbal.

1.1.1 Rear View

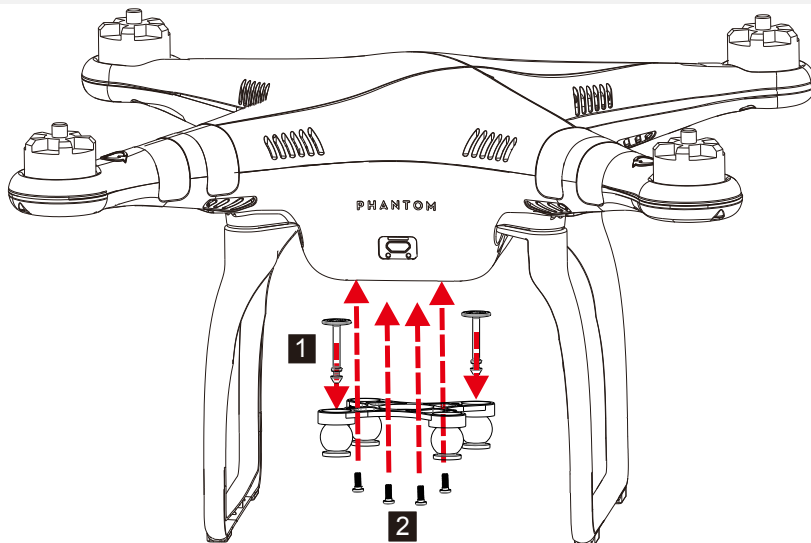


1. Yaw servo driver module	2. Upper plate of damping unit
3. Vibration absorbers	4. Bottom plate of damping unit
5. Tilt servo driver module	6. Roll servo driver module
7. Camera mount	8. 8 pin connector port (to GCU/Phantom 2)

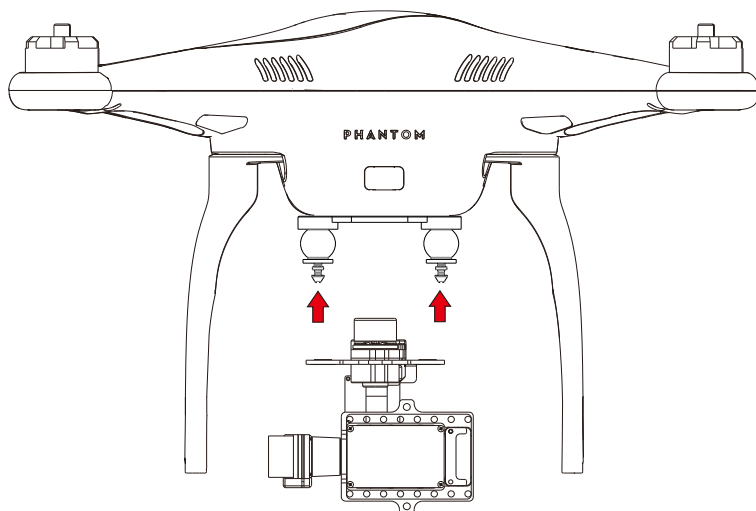
1.2 Install H3-3D to Phantom 2

Follow the below instructions to install the H3-3D gimbal to Phantom 2.

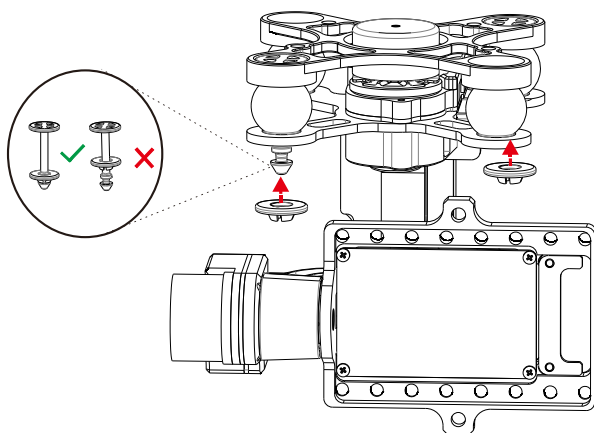
1. Insert one securing pins through the assigned holes then another diagonally opposite. Attach and secure the upper plate to the Phantom 2 with four M2.5x5 screws.



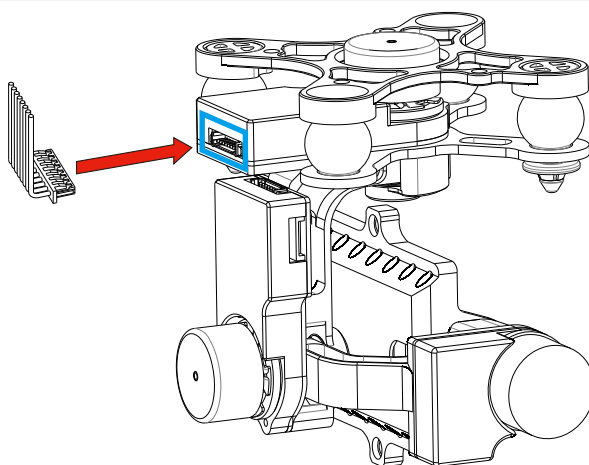
2. Attach the damping unit bottom plate to upper plate using the four vibration absorbers. Ensure the lip of the vibration absorbers are properly inserted through the mounting holes on the bottom plate.



3. Insert washers into securing pins to lock the damping unit in place.



4. Plug 8-Pin cable into the 8-Pin port on the gimbal.



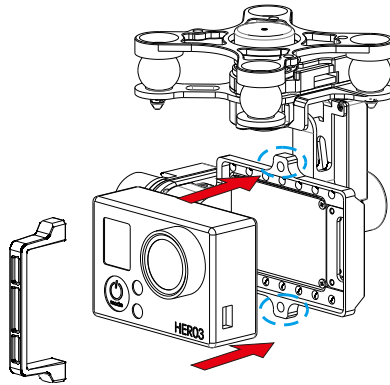
Caution:

- (1) Aircraft and accessories are not included with gimbal.
- (2) Camera must be aligned with the nose of the aircraft.
- (3) Gimbal is calibrated before delivery. Do not attempt to adjust or calibrate it yourself.
- (4) Do not attempt to remove screws in the gimbal, which may result in reduced performance or even damages.
- (5) Do not unplug any cable attaching to the gimbal ports, or change the mechanical structure of the gimbal.

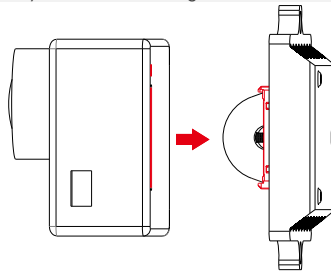
1.3 Camera Installation

Follow the below instructions to mount the GoPro.

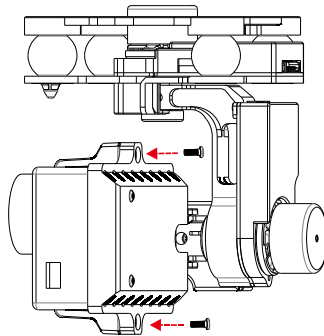
1. Insert one securing pine through the assigned hole on the damping unit upper plate then another diagonally opposite. Attach the damping unit upper plate to the Phantom 2 with four M2.5x5



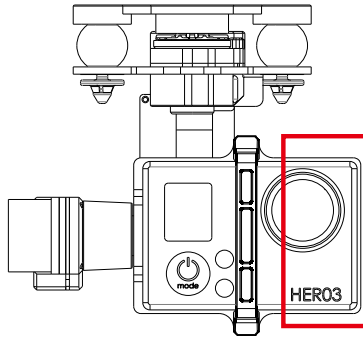
2. Press camera connector firmly onto the mounting dock connector highlighted in red.



3. Secure the mounting bracket using two M2.6x6.3 screws..

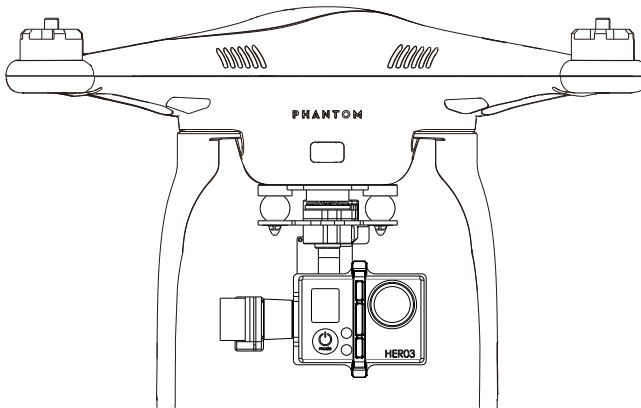


4. Take note of the camera connector's location and avoid applying excessive forces to the highlighted area when removing the camera.



1.4 Final Checks

Ensure the installed damping unit is aligned parallel with the Phantom 2.



2 GCU Connection

GCU Port Description	
3S-6S	Connect to battery for GCU or gimbal power
G8	Connect to G8 pin port on the gimbal for signal transmission
	Connect to PC to upgrade firmware using Assistant Software
	Connect to flight control system
	Connect to wireless video downlink module

2.1 Connect GCU and Flight Control System

Notes:

- (1) Skip this chapter if you purchase the Phantom 2 version of H3-3D gimbal, as it does not come with GCU.
- (2) GCU must be connected to the flight control system before it is powered on.
- (3) Be sure to mount the camera onto the gimbal before power on the aircraft and the gimbal. Otherwise it might damage the servo due to the incorrect center of gravity setting.
- (4) Re-calibrate the remote controller when NAZA-M firmware is upgraded.
- (5) Ensure all the connection is correct, otherwise it might causes damage to the gimbal or the flight control system.

GCU can either be vertically or horizontally installed on the Phantom 2. Follow the procedure below to complete the connection between the GCU and flight control system.

Step 1. Upgrade the firmware of the flight control and the Assistant Software to the latest version (as shown in the table below)

	A2	WKM	NAZA-M V2	NAZA-M
Assistant Software	V 1.20 (or higher)	V2.00(or higher)	V2.12(or higher)	V2.12(or higher)
Firmware Version	V 2.10 (or higher)	V5.22(or higher)	V3.12(or higher)	V3.12(or higher)

Step 2. Complete the connection on the flight control system (shown as the below table). For NAZA-M user, you need a PMU V2 module (accessory of NAZA-M V2) to provide with the CAN port connection.

	A2	WKM	NAZA-M V2 or NAZA-M
(1) Main Controller and PMU connection	Connect the X1 port of PMU to X1 port of Main Controller.	Connect the X1 port of PMU to X1 port of Main Controller.	Connect the X3 port of PMU V2 to X3 port of Main Controller.
(2)PMU Power Cable connection	Connect the power cable to a connector or solder the power cable to the central board if the DJI-multirotor is being used.		
(3) GPS/Compass Module and Flight Control System Connection	Connect to the CAN 2 port on the A2.	Connect the GPS/Compass module to spare CAN-Bus port on PMU.	Connect the GPS/Compass module to the GPS port of PMU V2.

Refer to [2.2 GCU and DJI flight control System Connection](#) for more information about the connection. For details on the flight control system connection, refer to the corresponding flight control system user manuals.

Step 3. Connect the GCU to flight control system. And then connect the 8-Pin cable of gimbal to the G8 port on the GCU.

	A2	WKM	NAZA-M V2	NAZA-M
(1) GCU and flight control System connection	Connect to the CAN 2 port on A2.	Connect the GCU to the spare CAN-Bus port on the WKM system.	Connect the GCU to the CAN-Bus port on the PMU V2 module.	
(2) GCU Power Cable connection	Connect the power cable to a connector or solder the power cable to the central board if the DJI-multirotor is being used.			
(3) Gimbal Tilt control channel	H3-3D	X3	X1	

Step 4. Connection finished. Power on the aircraft to launch.

Step 5. To fully utilize the gimbal, you also need to configure the tilt function of the gimbal. Flight control system assigns a specified channel (X3 channel for WKM, X1 for NAZA-M and H3-3D for A2) to control the tilt motion of the gimbal. To activate the tilt function, user needs to properly set up the channel in the Assistant Software and ensure the connection between the receiver and the main controller is correct. Refer to the Gimbal Assistant Software for details.

2.2 GCU and Flight Control System Connection

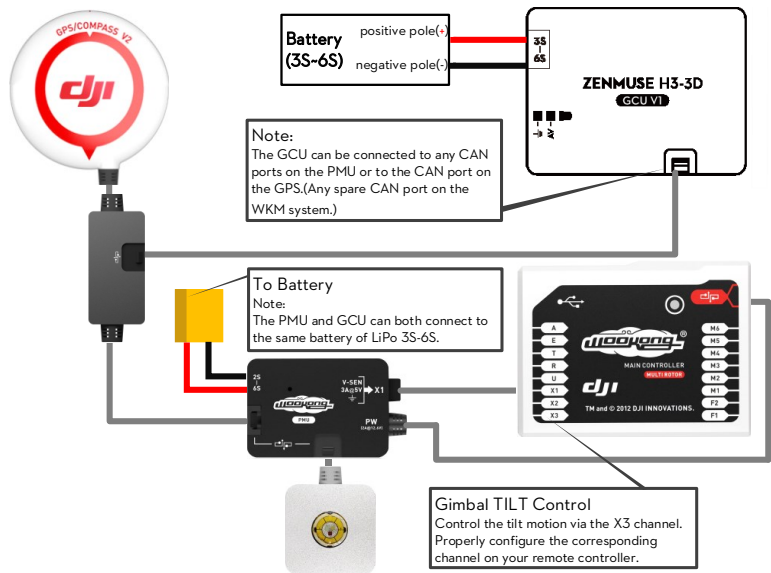


Fig.1 WKM Connection Diagram

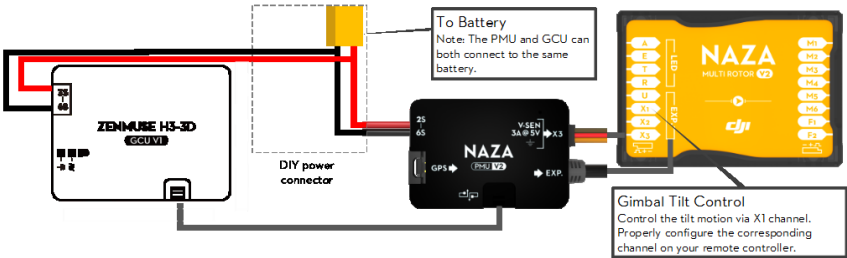


Fig.2 NAZA-M V2 Connection Diagram

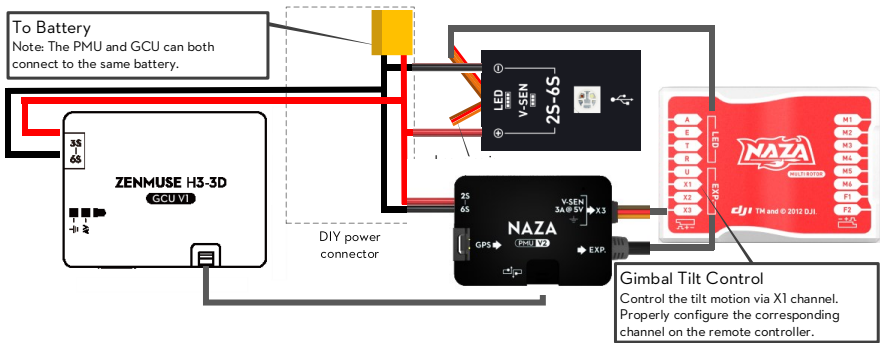
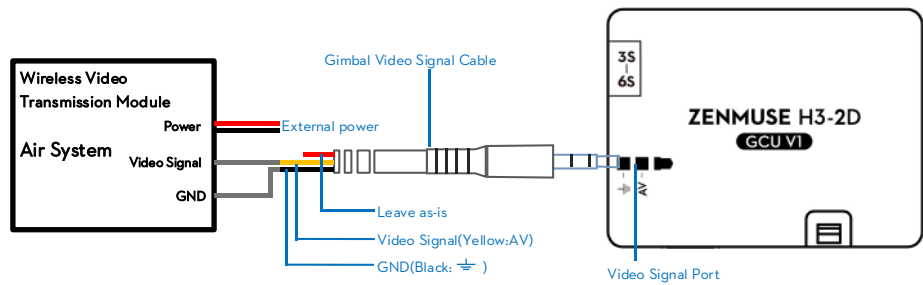


Fig.3 NAZA-M Connection Diagram

2.2 Video Connection.

Wireless video transmission transfers video signal from the on-board camera to the GCU via the gimbal video signal cable. Follow the figure below to complete the connection.



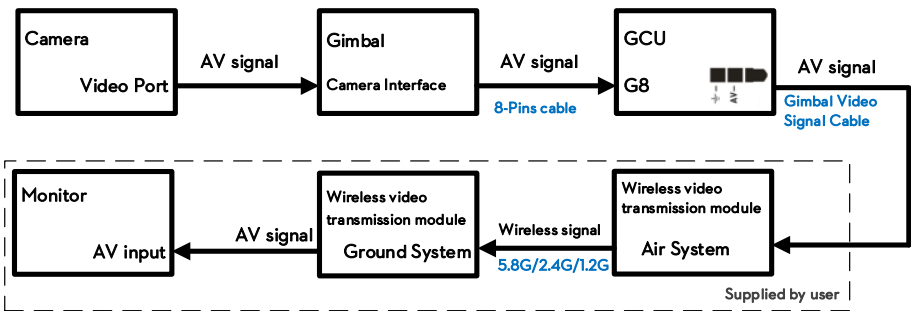
1. Solder the Video Signal/GND cables to wireless video transmission module (air system).
2. Plug the gimbal video signal cable jack into the GCU video signal port.

Notes

- (1) Ensure to connect the wireless video transmission unit to the GCU before powering on the aircraft.
 - (2) It is recommended to use standard gimbal video signal cable. Make sure you solder the gimbal video signal cable to the wireless video transmission module firmly. Insulated all the cables to prevent short circuiting.
- Legend:**
- Leave as-is
 - Video Signal Cable(AV)
 - GND Cable
- (3) GCU does not provide power to the wireless transmission module. Refer to the wireless video transmission module manual for details on the power supply connection.

Tips:

- (1) The below diagram shows the how video signal flows from the on-board camera to the gimbal.
- (2) Should error occurs, examine each checkpoints on the below diagram to locate the source of the problem.



3 Configuration

3.1 Driver and Assistant Software Installation

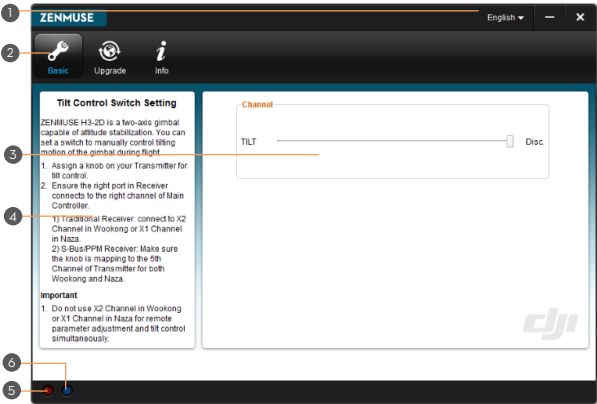
Notes:

- (1) The content of this chapter does not apply to the Phantom 2 version of the gimbal. Refer to Phantom 2 Assistant Software on the DJI website instead.

1. Ensure the drivers for the flight control system are properly installed.
2. Download the Assistant Software from DJI official website.
3. Launch Assistant Software installer and follow the prompted steps to finish installation.
4. Run the Assistant Software.

3.2 Assistant Software GUI

Connect GCU to the PC via a Micro-USB cable and then power on the GCU.



The screenshot shows the ZENMUSE Assistant Software interface. On the left, a 'Tilt Control Switch Setting' panel contains instructions for connecting the gimbal to a transmitter. On the right, a 'Channel' slider is shown with a 'Disc' button. Numbered callouts 1 through 6 point to specific UI elements: 1 points to the 'Language' dropdown, 2 to the 'Menu' icon, 3 to the 'Tilt Control Switch Setting' panel, 4 to the 'Text Description' area, 5 to the 'Connection indicator' (LED status), and 6 to the 'Communication indicator' (LED status).

- 1 **Language**
 - 中文 or English
- 2 **Menu**
 - Basic: Basic function setting
 - Upgrade: For upgrading the gimbal firmware
 - Info: For version and serial number information
- 3 **Tilt Control Switch Setting**

ZENMUSE H3-2D is a two-axis gimbal capable of attitude stabilization. You can set a switch to manually control tilting motion of the gimbal during flight.

 1. Assign a knob on your Transmitter for tilt control.
 2. Ensure the right port in Receiver connects to the right channel of Main Controller.

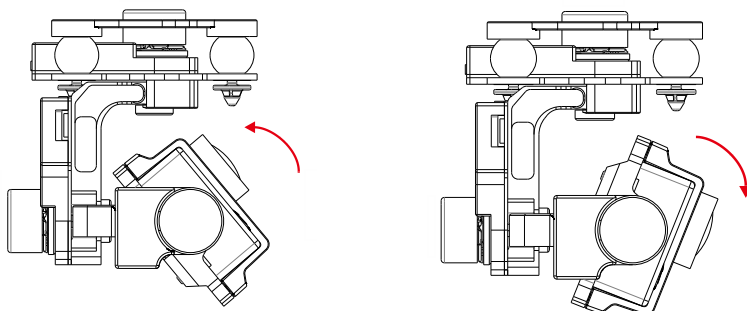
1) Traditional Receiver: connect to X2 Channel in Wookong or X1 Channel in Naza.
2) S-Bus/PPM Receiver: Make sure the knob is mapping to the 5th Channel of Transmitter for both Wookong and Naza.

Important

 1. Do not use X2 Channel in Wookong or X1 Channel in Naza for remote parameter adjustment and tilt control simultaneously.
- 4 **Text Description**
 - Hover on the area ⑤ to display the information.
- 5 **Connection indicator**
 - Red LED On: Disconnected from PC
 - Green LED On: Connected with PC
- 6 **Communication indicator**
 - Blue LED On: Lost communication
 - Blue LED Blink: Communicating

3.3 Channel Setting

You can adjust the range of camera tilt motion from Assistant Software by sliding the slider in the GUI.



3.4 Firmware & Software Upgrade

3.4.1 Firmware Upgrade

Follow the below procedures to upgrade the firmware upgrade, failure to do so might damage the gimbal:

1. Ensure your computer has access to the internet.
2. Close all the other applications (anti-virus application or firewall) before upgrading the firmware.
3. Make sure the power supply is securely connected. DO NOT unplug the power supply before the upgrade completes.
4. Connect the GCU to PC through a Micro-USB cable, DO NOT disconnect the cable until firmware upgrade completes.
5. Launch the Assistant Software and wait until connection is established.
6. Select **Upgrade** → Main Control, IMU and CMU.
7. DJI Innovations server will check the current firmware version,
8. If a newer firmware is detected, the Assistant Software will download the upgrade the firmware automatically.
9. Wait until the firmware upgrade completes.
10. Click **OK** and power cycle the system to finish the upgrade process.

Notes:

- (2) CMU stands for “Camera Multi Unit”, which is management module for the camera.
- (3) To eliminate the interference from the master control, it is recommended to disconnect the CAN-Bus cable between GCU and master control before you upgrade the IMU or CMU.
- (4) Double check the parameters once you have finish upgrading the firmware.
- (5) Repeat (1) to (4) when the DJI server experiences heavy traffics or firmware upgrade fails.

3.4.2 Software Upgrade

Click Info → Software Info, if the latest version is higher than the current version, you are advised to upgrade the Assistant Software.

Obtain the serial number of the gimbal by clicking the “Info” → “SN”. SN is a 32 digits authorization code that is used to activate the gimbal. This authorization code has been filled at the manufacturing site when before its shipment. You might be prompted to fill a new SN if you purchase a new feature in the future. If you fills an invalid SN for more than 30 times, the gimbal will be locked and you have to contact our customer support to unlock the gimbal.

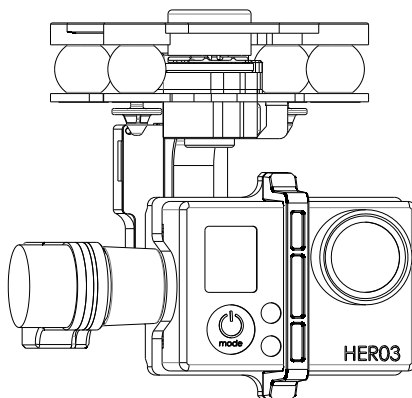
4 Test Fly

4.1 Check List Before Flight

For safety reasons, check of the following items before each flight:

- (1) Gimbal is firmly installed to aircraft, and camera mounted correctly. Make sure the camera is aligned parallel with nose direction of the aircraft.
- (2) All cables are firmly and correctly connected.
- (3) Ensure gimbal video signal cable is in solid soldering condition.
- (4) Make sure the wireless video transmission module is connected to GCU before powering on the system.
- (5) Transmitter is properly configured.
- (6) Camera connection is correct.
- (7) GCU and flight control system connection is correct.
- (8) Flight control firmware version is latest.

4.2 Gimbal Test



1. Ensure all the batteries are fully charged.
2. Switch on the transmitter.
3. Power on the camera first then power on the gimbal and wait until gimbal self-test completes.
4. Initialization completes, camera lens point to aircraft nose direction, that is, the three axes of gimbal should be in the condition as the above diagram shows.
5. Toggle the tilt control switch on your transmitter, and make sure it is working properly. Then try to feel if your gimbal moves to the corresponding direction. If not, check your settings.
6. When finishing test, power off the gimbal first then the camera.

Note:

- If the gimbal is not working normally, refer to *Trouble Shooting* for solutions.

- Place the aircraft on flat surface during the test. When conducting the test while you are holding the aircraft by hands, bear in minds not to tilt the aircraft beyond 35°
- Do not land the aircraft with powered-on gimbal on uneven terrain (such as grass lawn or rocky roads), in which environment there may have external forces act on the gimbal otherwise the gimbal may enter hibernation due to external forces.
- Hibernation mode offers protection for the gimbal. When the gimbal is not mounted with the camera, the gimbal enters the hibernation mode. During hibernation, the gimbal does not respond to the transmitter's command. The gimbal quits hibernating and resumes operation when it is mounted with the camera.
- Gimbal enters hibernation mode when it detects excessive external force is being applied, only when the external force is no longer detected, the gimbal will restore from the hibernation.
- It's better to use separate battery pack to test the gimbal at the beginning to ensure functionality before making steps to power on of flight controller, gimbal, OSD, FPV gears etc.

Appendix

Trouble Shooting

NO.	Symptom	Cause	Action
1	Gimbal keeps drifting after initialization.	(1) Transmitter trims value is beyond the limit. (2)GCU disconnects from flight control system. (3)Gimbal mounting is not aligned with the aircraft.	(1) Adjust the transmitter trims value. (2)Connect GCU and flight control system (3)Align the gimbal mounting is aligned with the aircraft nose.
2	Axis of the gimbal are not level.	Factory calibration error occurs.	Contact local dealer or DJI Innovations customer service for assistance.
3	Unable to determine gimbal orientation.	BVR (beyond visual range) flight	Try to use a wireless video transmission module.

Settings Using with the A2 Flight Control System

Users should configure the H3-3D's pitch control in the A2 assistant software when using with the A2 Flight Control System. Map the H3-3D channel to a switch on the transmitter. It is recommended to use a knob switch channel, which is only used for H3-3D pitch control on the "Channel Map" page (as the following diagram shown).

K1		0	☒	REV	Unmapped	IOC		0	☒	REV	Unmapped
K2		0	☒	REV	Unmapped	Go Home		0	☒	REV	Unmapped
K3		0	☒	REV	Unmapped	Gear		0	☒	REV	Unmapped
K4		0	☒	REV	Unmapped	H3-3D		0	☒	REV	Unmapped

Specifications

General	
Built-In Functions	(1) 3-axis gimbal (2) High precision brushless servo control (3) Aluminum alloy body (4) Built-in IMU module (5) Lightweight (6) A2, WKM, NAZA-M, NAZA-M V2 ,PHANTOM 2 supported (7) GoPro3 and GoPro3+ supported (8) Zenmuse technology
Peripheral	
Supported Camera	GoPro3, GoPro3+ (black or silver version)
GCU Input Power	3S-6S LiPo (12V-26V)
Assistant Software System Requirement	Windows XP SP3; Windows 7; Windows 8
Mechanical & Electrical Characteristics	
Working Current	- Static current: 400mA (@12V) - Dynamic current: 600mA (@12V)
Gimbal Input Power	3S-6S (12V ~26V)
Operating Temperature	-10 °C ~ 50 °C
Gimbal Weight	168g(camera excluded)
Gimbal Dimensions (With Damping Unit)	97mm X 95mm X 73mm
GCU Weight	22g
GCU Dimensions	42 mm X32 mm X9.3 mm
Working Performance	
Controlled Angle Accuracy	$\pm 0.08^{\circ}$
Maximum Controlled Rotation Speed	Tilt axis: $\pm 130^{\circ}/s$
Controlled Rotation Range	Tilt axis control: $-130^{\circ} \sim +45^{\circ}$
Regulatory Approvals	
FCC (USA)	Yes
CE (EU)	Yes
ROHS(EU)	Yes